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ESOO1: VERIFICATION OF MODEL FOR NEW YORK HARBOR

Steven C. Chapra, et al

Environmental Protection Agency
New York, New York

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

ES001: Verification of Model for New York Harbor

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15. Supplementary Notes

16. Abstracts

ES001 is a computer model which predicts the steady-state distribution of water quality variables for a one dimensional estuary. This report presents an application of the computer model ES001 to an actual estuarine system, by simulating the New York Harbor complex. The waste loads and system parameters presented are for average July-August conditions from 1954 to 1964. The effect on water quality of hypothetical levels of raw waste treatment are also presented.

17. Key Words and Document Analysis. 17a. Descriptors

*Water Quality, *Mathematical model, Simulation Analysis, Oxygen Demand, Nutrients

17b. Identifiers/Open-Ended Terms

Estuarine Systems, New York Harbor

17c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Release to Public	UNCLASSIFIED	48
	20. Security Class (This Page) UNCLASSIFIED	22. Price

As an illustration of the applicability of ES001 to an actual estuarine system, a model of the New York Harbor Complex has been constructed.

Based primarily on the Hydroscience report[1] and the work of O'Connor and Mancini,[11] the program was applied to the study area shown in Figure NY-1. By considering the physical and biological aspects of the system as well as the waste loads (See Table NY-1) the segmentation scheme of Figure NY-2 was developed.

Using the waste loads and the system parameters (Table NY-2) a verification run for average July-August conditions from 1954 to 1964 was run. The results of this run are presented in Figures NY-3 and NY-4.*

As an illustration of the use of the model as a planning tool, the effect of changes in treatment procedures can be investigated. For instance figure NY-5 depicts the effect of collecting the raw uniform waste discharges along the west side of New York City in a single treatment facility at mile point -9.6 of the Hudson River (junction UPT). Then, the effect of various levels of treatment can be input to the model and the results can be compared with alternative treatment proposals. O'Connor and Mancini[11] have done a much broader analysis and their work gives an excellent idea of the degree of applicability of a model such as ES001 to water quality planning.

As stated previously, however, care must always be taken to consider all the underlying assumption of the model when applying it to a specific situation. For instance, in some cases, the one dimensional approach of ES001 would be inapplicable.

The high temperatures near the point of a thermal discharge from a power plant might be significantly minimized by assuming that the estuary is instantaneously mixed vertically and laterally. In such a case a "near field" model which actually attempts to describe the plume of heated water in fine detail might be required to answer questions as to the effect of the discharge or the ecology.

In other cases, the steady-state, tidally averaged approach of the model would not be sufficient to answer real-time** questions. Daily and Harlemann have considered the treatment alternative of discharging of

*as well, at the end of this appendix all input and output are included for reference.

**real time: time within the tidal cycle which allows the effects of tidal oscillation on water quality to be depicted explicitly.

waste only on the ebb tide in Cork Harbor, Ireland so that the waste is more efficiently flushed to the ocean. To do this they used a one-dimensional, time variable model. Such an alternative cannot be considered using ES001.

In conclusion, it must be stressed that the management questions being asked and the physical system being modeled in a given situation will essentially determine the modeling approach which is applicable. In no case can it even be construed that one approach or one model will supply THE answer to any and every water quality problem. With this in mind it can be reiterated that ES001 is an excellent tool for many situations in the analysis of water quality in estuaries.

References

1. Hydroscience, Inc.: Mathematical Models for Water Quality for the Hudson-Champlain and Metropolitan Coastal Water Pollution Control Project, FWPCA. Hydroscience, Inc., Westwood, N.J., April 1968.

11. O'Connor, D. J. and Mancini, J. "Water Quality Analysis of the New York Harbor Complex" Journal WPCF, November 1972.

TABLE NY-1 - New York Harbor Waste Inputs

Source	River Location (miles)	Carbonaceous BOD (1,000 lb/day)	Nitrogenous BOD (1,000 lb/day)	Ultimate Oxygen Demand (1,000 lb/day)
Yonkers	16(N)*	50	20.9	118.6
Bronx	12.9-16.1(N)	2/mile	0.6/mile	6.9/mile
Edgewater	9(N)	5	2.1	10.6
North Bergen	7(N)	2.5	1.0	5.25
West New York	5(N)	12.7	5.3	27.1
Hoboken	2(N)	20.7	8.3	43.5
Jersey City	0(N)	25.4	10.4	53.6
Passaic Valley	-4(H)*	623	75.0	1074
Bayonne	-4(H)	17.9	7.4	38.1
Port Richmond	-4(H)	7.0	2.8	14.7
Owls Head	-4(H)	80	48	262
Manhattan	2.7-5.4(N)	30/mile	9/mile	58.5/mile
	5.4-12.9(N)	30/mile	9/mile	58.5/mile
Wards Island	9.4	47.6	40	131.5
Bowery Bay	10(E)	29.3	17.6	70.5
Hunts Point	12(E)*	12.9	10.8	35.6
Tallmans	14(E)	5.1	4.3	14.5
Walcott Street	-0.4(H)	17.0	5.1	33.2
Kane Street	0.4(E)	7.0	2.1	13.65
Manhattan East River	0-7.0(E)	15/mile	4.5/mile	29.25/mile
Joralemon to Wallabout	0.8-2.9(E)	9.38/mile	2.8/mile	18.2/mile
Wallabout to Newton	2.9-4.8(E)	27.7/mile	8.3/mile	54/mile
Newton Creek	4.8(E)	30.73	9.2	59.8
Red Hook	1.5(H)	35.0	10.5	68.3
Hess Chevron	9.59(A)**			7190
Kopps Wood U.S. Metals FMC	6.75(A)			770
American Cyanamid, Linden Citgo General Anilene DuPont Grasselli	3.45(A)			42207
Humble Oil	1.38(A)			72400
Archer Daniels Procter & Gamble	.625(A)			12200
Domestic Plant	1.166(A)			172500
"	2.528(A)			64525
"	7.758(A)			77250
"	8.048(A)			7045
"	11.828(A)			7500

*N = North River input; E = East River input, and H = harbor input. (mile point zero at Buttery).

**A = Arthur Kill input (mile point zero at 1800 yards East of Shooters Island)

Note: Miles X 1.61 = km;lb/day X 0.454 = kg/day.

	E (mi^2/day)	RK,DK* (1/day)	AK* (1/day)	Cross Section Area (sq. ft)	Tidal Exchange (1/day)	Volume (Cuft)	Fresh Water Flow** (cfs)
North River (1,2,3,4)	20	0.25	0.10	135000			7290
Upper New York Harbor (5,6,7)	24	0.25	0.07	340000			7290
Harlem River (8,9)	15	0.25	0.30	6800			
Lower East River (11,12	10	0.25	0.09	80000			
Upper East River (10)	10	0.25	0.08	100000			
(20)	10	0.25	0.08	150000			
Kill Van Kull (13,14)	10	0.25	0.125	50000			
Arthur Kill (15)	10	0.25	0.15	26500			
(16)	10	0.25	0.15	28000			
(17)	10	0.25	0.15	35000			
(22)	10	0.25	0.15	50000			
Lower New York Bay (19)	24	0.25	0.07	340000	0.35	$1.2X10^{10}$	7290
Newark Bay (21)	10	0.26	0.30	68000		$1.2X10^{9}$	

* @ 20°C

** Average fresh water discharge at New York from the Hudson River for July and August from 1954 to 1964.

Note - numbers in parenthesis refer to sections.

Table NY - 2 Parameters for New York Harbor Model verification

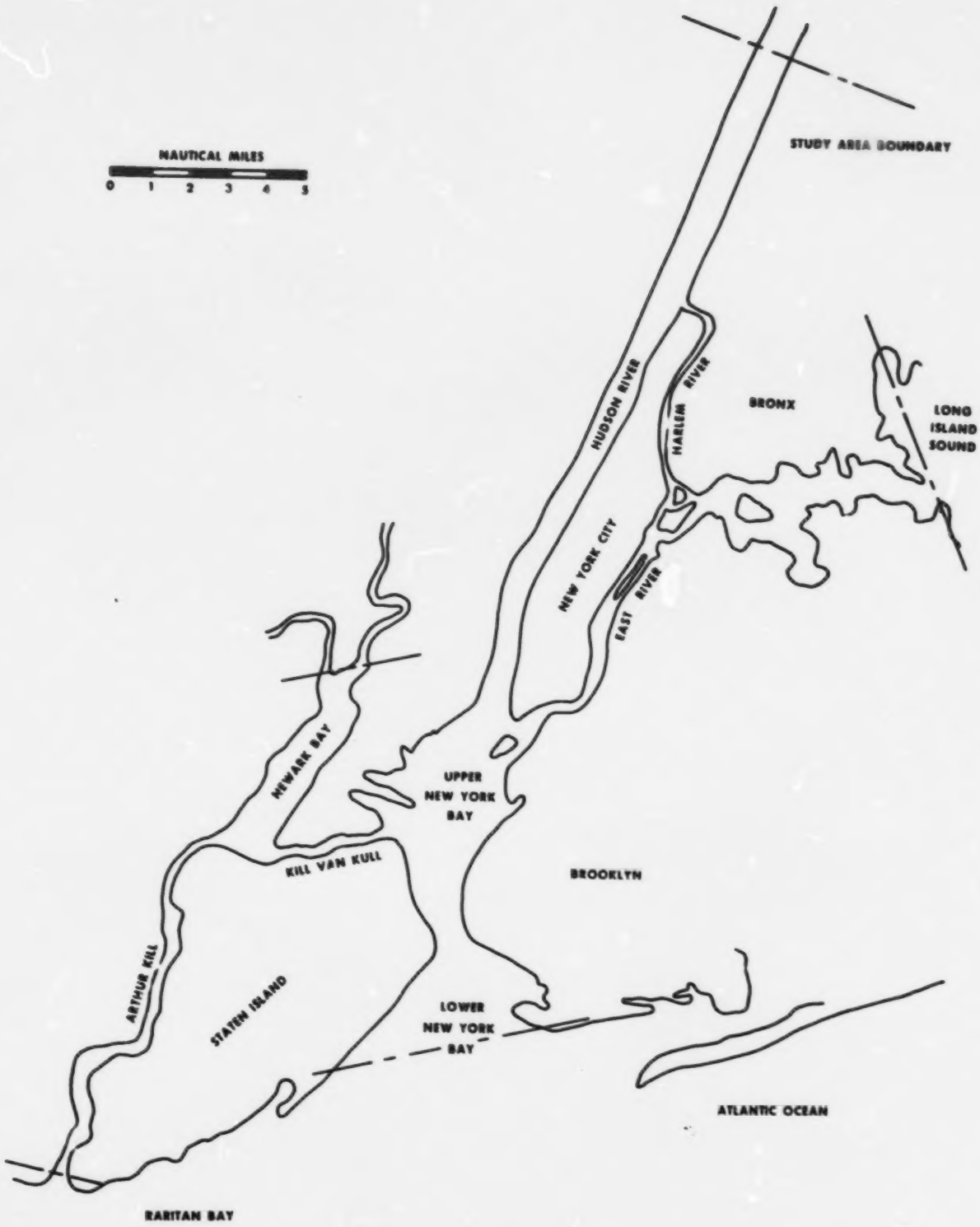


Figure NY-1

STUDY AREA OF MODEL OF NEW YORK HARBOR

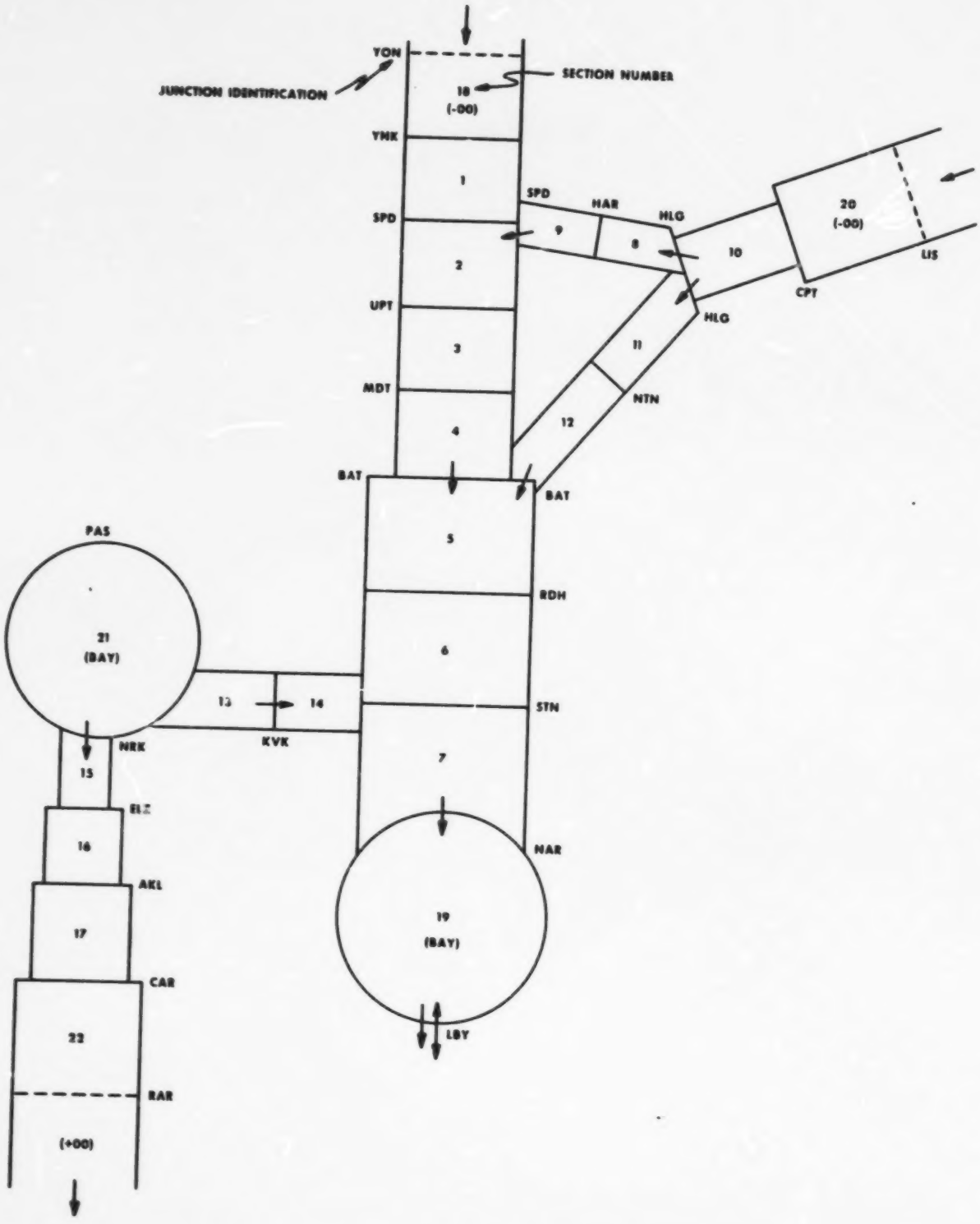
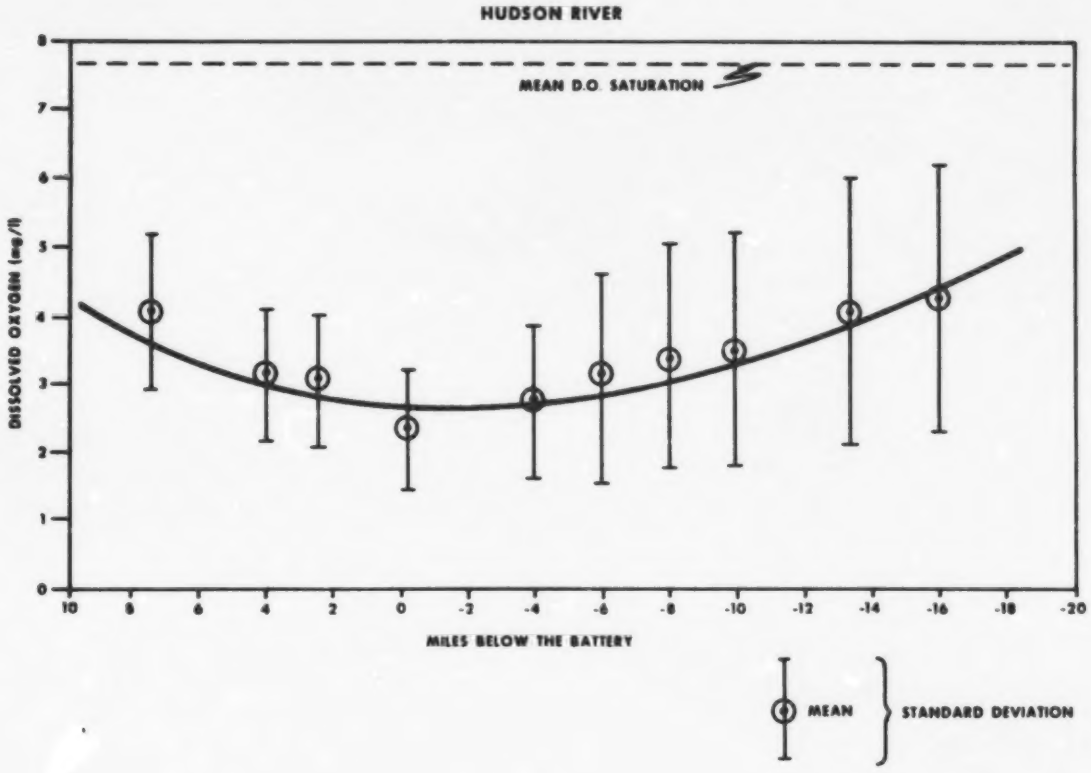


Figure NY-2

SEGMENTATION SCHEME FOR NEW YORK HARBOR COMPLEX



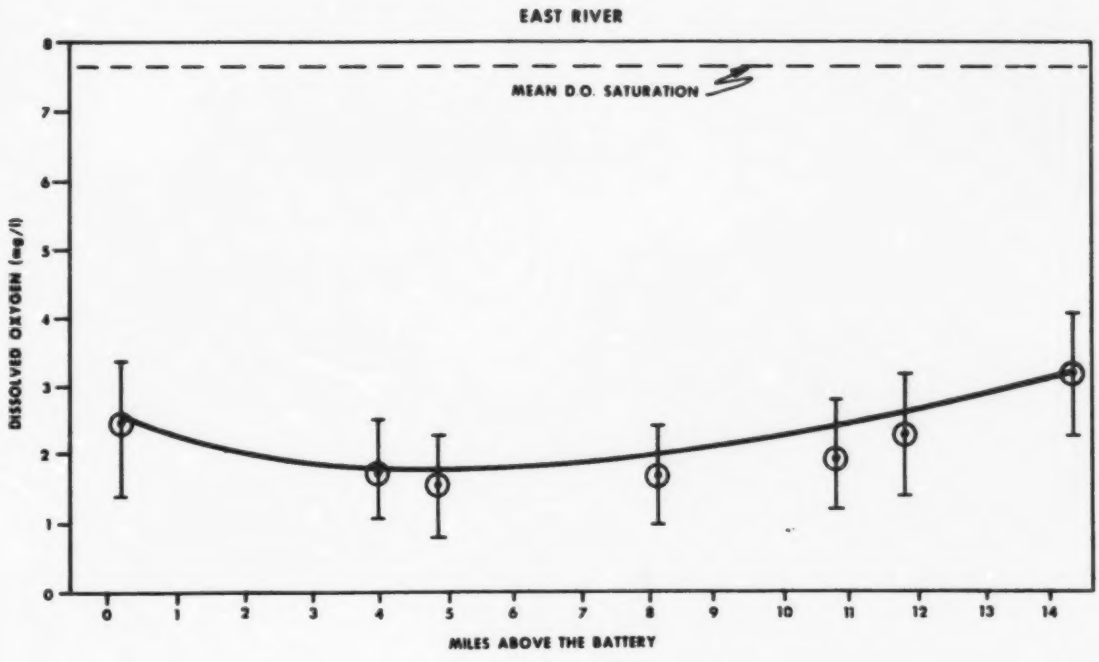
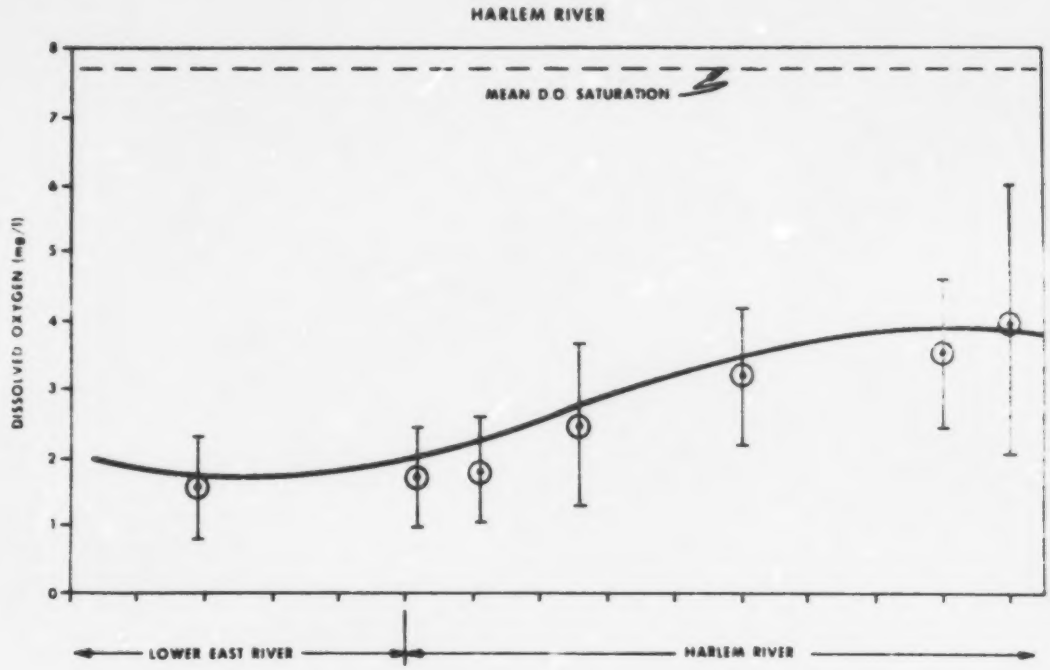


Figure NY-3
NEW YORK MODEL VERIFICATION



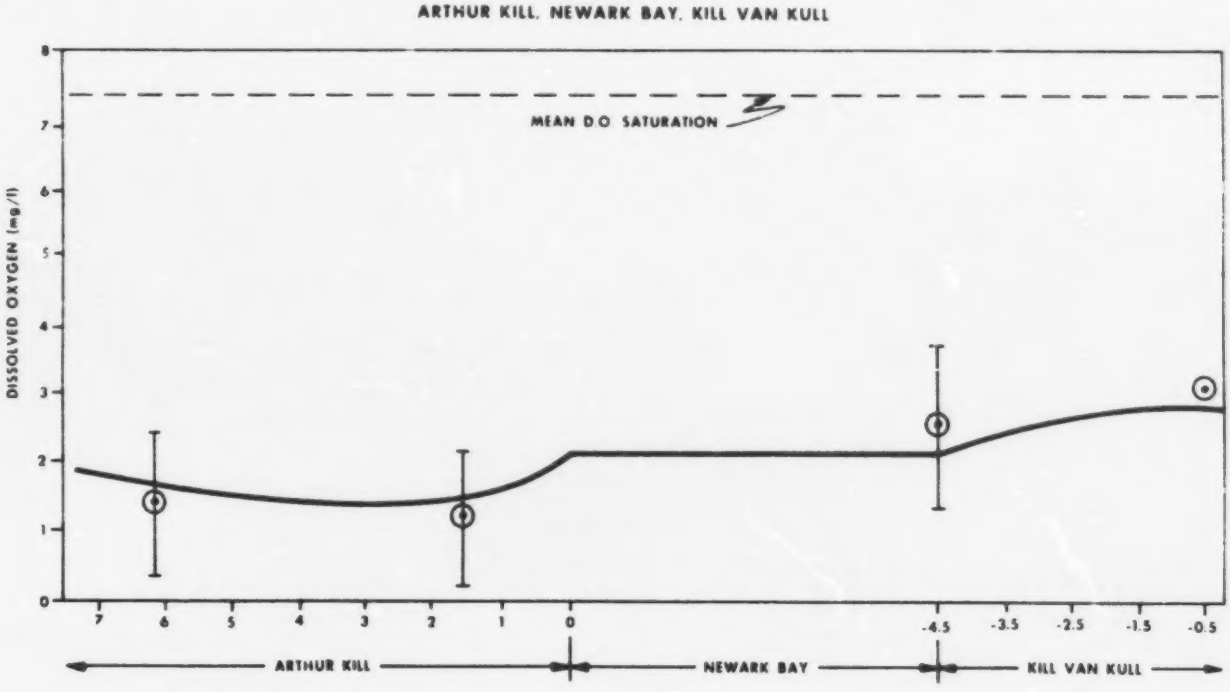


Figure NY-4

NEW YORK MODEL VERIFICATION

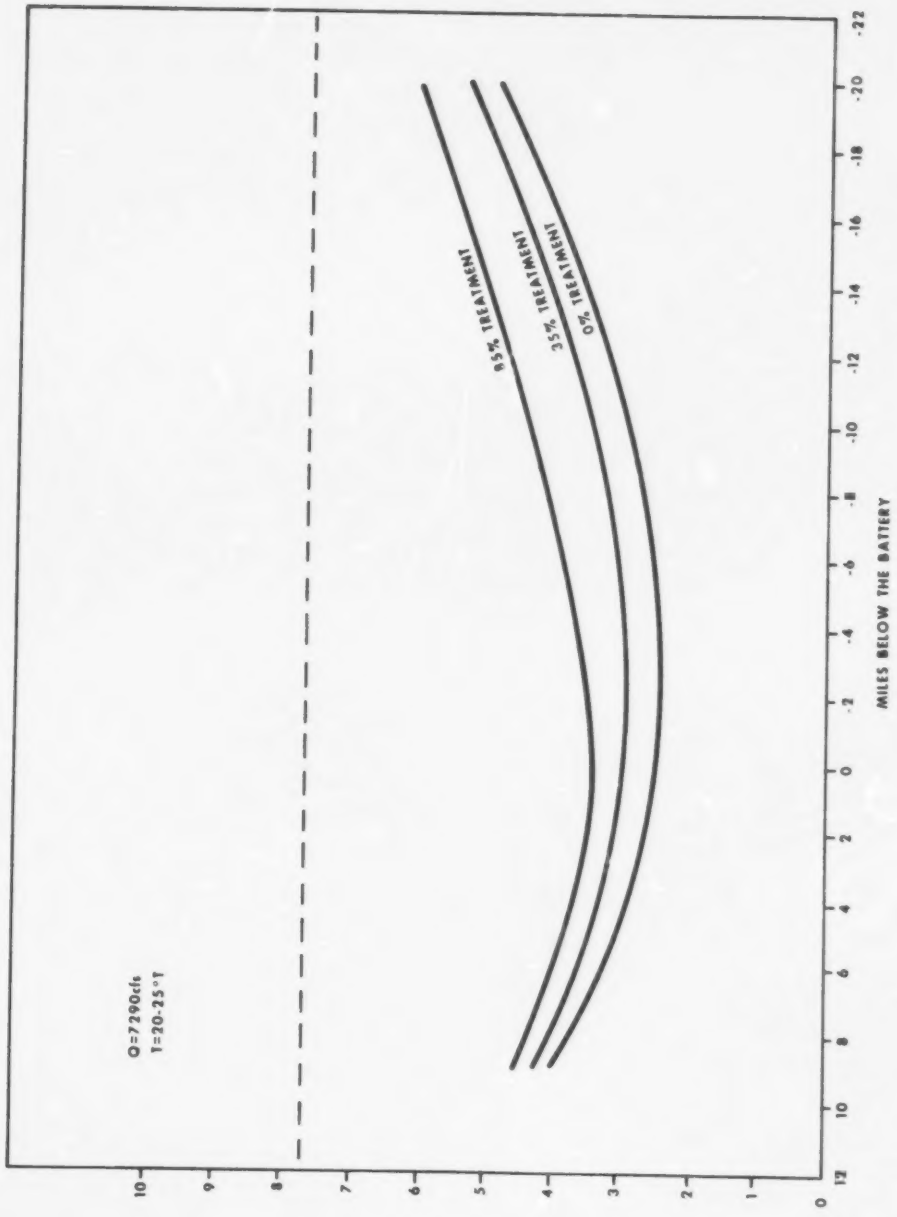


Figure NY-5

EFFECT OF HYPOTHETICAL TREATMENT PLANT ON NORTH RIVER

JOB ID AND DATE CARD

NYHR 0672 17 5 0 0 0 1.020 1.040 1.040 NY HARBOR TEST RUN

INPUT SECTION CARD LISTING

0	1	0	YNK	-15.900	135000.0	0.250	0.100	1.000	7287.0	0.0	0.690E 04	0.0	NYHR
0	1	1	SPD	-13.000	0.0	0.250	20.000	23.370	0.0	35.000	0.0	1.000	RVDL
0	2	0	SPD	-13.000	135000.0	0.250	0.100	1.000	7287.0	0.0	0.585E 05	0.0	NYHR
0	2	1	UPT	-9.600	0.0	0.250	20.000	23.370	0.0	32.000	0.0	1.000	GWBR
0	3	0	UPT	-9.600	135000.0	0.250	0.100	1.000	7287.0	0.0	0.585E 05	0.0	NYHR
0	3	1	HDT	-5.200	0.0	0.250	20.000	23.370	0.0	50.000	0.0	1.000	HDTN
0	4	0	HDT	-5.200	135000.0	0.250	0.100	1.000	7287.0	0.0	0.293E 05	0.0	NYHR
0	4	1	HAT	0.0	0.0	0.250	20.000	23.370	0.0	50.000	0.0	1.000	DNTN
0	5	0	BAT	0.0	340000.0	0.250	0.070	1.000	7287.0	0.0	0.0	0.0	NYHR
0	5	1	RDH	1.500	0.0	0.250	24.000	22.070	0.0	49.000	0.0	1.000	GVIS
0	6	0	RDH	1.500	340000.0	0.250	0.070	1.000	7287.0	0.0	0.0	0.0	NYHR
0	6	1	STN	4.100	0.0	0.250	24.000	22.070	0.0	56.000	0.0	1.000	UPBY
0	7	0	STN	4.100	340000.0	0.250	0.070	1.000	7287.0	0.0	0.0	0.0	NYHR
0	7	1	NAR	9.000	0.0	0.250	24.000	22.070	0.0	35.000	0.0	1.000	NARR
0	8	0	HLG	-7.000	6800.0	0.250	0.300	1.000	0.0	0.0	0.0	0.0	NYHR
0	8	1	HAR	-4.000	0.0	0.250	15.000	23.250	0.0	20.000	0.0	1.000	UHRL
0	9	0	HAR	-4.000	6800.0	0.250	0.300	1.000	0.0	0.0	0.0	0.0	NYHR
0	9	1	SPD	0.0	0.0	0.250	15.000	23.250	0.0	18.000	0.0	1.000	LHRL
0	10	0	CPT	5.000	100000.0	0.250	0.080	1.000	0.0	0.0	0.0	0.0	NYHR

0	10	1	HLG	9.200	0.0	0.250	10.000	21.940	0.0	60.000	0.0	1.000	RIKI
0	11	0	HLG	-7.700	80000.0	0.250	0.090	1.000	0.0	0.0	0.398E 05	0.0	NYHR
0	11	1	NTN	-4.100	0.0	0.250	10.000	22.470	0.0	40.000	0.0	1.000	UPER
0	12	0	NTN	-4.100	80000.0	0.250	0.090	1.000	0.0	0.0	0.544E 05	0.0	NYHR
0	12	1	BAT	0.0	0.0	0.250	10.000	22.470	0.0	33.000	0.0	1.000	LWER
0	13	0	NRK	-3.000	50000.0	0.250	0.125	1.000	0.0	0.0	0.0	0.0	NYHR
0	13	1	KVK	-1.500	0.0	0.250	10.000	23.420	0.0	35.000	0.0	1.000	UKVK
0	14	0	KVK	-1.500	50000.0	0.250	0.125	1.000	0.0	0.0	0.0	0.0	NYHR
0	14	1	STN	0.0	0.0	0.250	10.000	23.420	0.0	35.000	0.0	1.000	LKVK
0	15	0	NRK	0.0	26500.0	0.250	0.150	1.000	0.0	0.0	0.0	0.0	NYHR
0	15	1	ELZ	1.000	0.0	0.250	10.000	24.680	0.0	35.000	0.0	1.000	UAKL
0	16	0	ELZ	1.000	28000.0	0.250	0.150	1.000	0.0	0.0	0.0	0.0	NYHR
0	16	1	AKL	3.000	0.0	0.250	10.000	24.680	0.0	35.000	0.0	1.000	MAKL
0	17	0	AKL	3.000	35000.0	0.250	0.150	1.000	0.0	0.0	0.0	0.0	NYHR
0	17	1	CAR	7.500	0.0	0.250	10.000	24.680	0.0	35.000	0.0	1.000	LAKL
0	18	0	YDN	-20.000	135000.0	0.250	0.100	1.000	7267.0	0.0	0.0	0.0	NYHR
0	18	2	YNK	-15.900	0.0	0.250	20.000	23.370	0.0	40.000	0.0	1.000	YDNK
0	19	0	NAR	9.000	340000.0	0.250	0.070	1.000	7267.0	0.0	0.0	0.350	NYHR
0	19	4	LBV	13.000	0.0	0.250	24.000	20.820	0.0	35.000	0.120E 11	1.000	LWBV
0	20	0	LIS	0.0	150000.0	0.250	0.080	1.000	0.0	0.0	0.0	0.0	NYHR

0	20	2	CPT	5.000	0.0	0.250	10.000	21.940	0.0	65.000	0.0	1.000	LISD
0	21	0	PAS	-2.000	68000.0	0.250	0.300	1.000	0.0	0.0	0.0	0.0	NYHR
0	21	4	NRK	0.0	0.0	0.250	10.000	24.000	0.0	20.000	0.120E 10	1.000	NWKB
0	22	0	CAR	7.500	50000.0	0.250	0.150	1.000	0.0	0.0	0.326E 04	0.0	NYHR
0	22	3	RAR	12.000	0.0	0.250	10.000	24.680	0.0	35.000	0.0	1.000	RARN

SECTION 1 IS DBLE

SECTION 2 IS DBLE

SECTION 3 IS DBLE

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SECTION 11 IS DBLE

SECTION 12 IS DBLE

SECTION 13 IS DBLE

SECTION 14 IS DBLE

SECTION 15 IS DBLE

SECTION 16 IS DBLE

SECTION 17 IS OBLE

SECTION 18 IS S NI

SECTION 19 IS S CM

SECTION 20 IS S NI

SECTION 21 IS S CM

SECTION 22 IS S PI

INPUT JUNCTION CARD LISTING

1 YNK	2	18	-15.90	1	-15.90	0	0.0	118600.0	0.0	0.0	0.0	NYHR
2 YNK	6	18	-15.90	1	-15.90	0	0.0	118600.0	0.0	0.0	0.0	NYHR
3 SPD	1	1	-13.00	2	-13.00	0	0.0	0.0	0.0	0.0	0.0	NYHR
4 SPD	1	9	0.0	2	-13.00	0	0.0	0.0	0.0	0.0	0.0	NYHR
5 SPD	9	1	-13.00	2	-13.00	9	0.0	0.0	0.0	0.0	0.0	NYHR
6 UPT	1	2	-9.60	3	-9.60	0	0.0	0.0	0.0	0.0	0.0	NYHR
7 UPT	5	2	-9.60	3	-9.60	0	0.0	0.0	0.0	0.0	0.0	NYHR
8 MDT	1	3	-5.20	4	-5.20	0	0.0	86450.0	0.0	0.0	0.0	NYHR
9 MDT	5	3	-5.20	4	-5.20	0	0.0	86450.0	0.0	0.0	0.0	NYHR
10 BAT	1	4	0.0	5	0.0	0	0.0	100450.0	0.0	0.0	0.0	NYHR
11 BAT	1	12	0.0	5	0.0	0	0.0	100450.0	0.0	0.0	0.0	NYHR
12 BAT	9	4	0.0	5	0.0	12	0.0	100450.0	0.0	0.0	0.0	NYHR
13 ADH	1	5	1.50	6	1.50	0	0.0	68300.0	0.0	0.0	0.0	NYHR

14 RDH	5	5	1.50	6	1.50	0	0.0	68300.0	0.0	0.0	0.0	NYHR
15 STN	1	6	4.10	7	4.10	0	0.0	********	0.0	0.0	0.0	NYHR
16 STN	1	14	0.0	7	4.10	0	0.0	********	0.0	0.0	0.0	NYHR
17 STN	9	14	0.0	7	4.10	6	4.10	********	0.0	0.0	0.0	NYHR
18 NAR	4	7	9.00	19	9.00	0	0.0	0.0	0.0	0.0	0.0	NYHR
19 NAR	13	7	9.00	19	9.00	0	0.0	0.0	0.0	0.0	0.0	NYHR
20 CPT	2	20	5.00	10	5.00	0	0.0	121000.0	0.0	0.0	0.0	NYHR
21 CPT	6	20	5.00	10	5.00	0	0.0	121000.0	0.0	0.0	0.0	NYHR
22 HLG	1	10	9.20	8	-7.00	0	0.0	131500.0	0.0	0.0	0.0	NYHR
23 HLG	1	10	9.20	11	-7.70	0	0.0	131500.0	0.0	0.0	0.0	NYHR
24 HLG	8	10	9.20	8	-7.00	11	-7.70	131500.0	0.0	0.0	0.0	NYHR
25 HAR	1	8	-4.00	9	-4.00	0	0.0	0.0	0.0	0.0	0.0	NYHR
26 HAR	5	8	-4.00	9	-4.00	0	0.0	0.0	0.0	0.0	0.0	NYHR
27 NTN	1	11	-4.10	12	-4.10	0	0.0	59800.0	0.0	0.0	0.0	NYHR
28 NTN	5	11	-4.10	12	-4.10	0	0.0	59800.0	0.0	0.0	0.0	NYHR
29 NRK	4	13	-3.00	21	0.0	0	0.0	0.0	0.0	0.0	0.0	NYHR
30 NRK	4	15	0.0	21	0.0	0	0.0	0.0	0.0	0.0	0.0	NYHR
31 NRK	12	13	-3.00	15	0.0	21	0.0	0.0	0.0	0.0	0.0	NYHR
32 KVK	1	13	-1.50	14	-1.50	0	0.0	0.0	0.0	0.0	0.0	NYHR
33 KVK	5	13	-1.50	14	-1.50	0	0.0	0.0	0.0	0.0	0.0	NYHR
34 ELZ	1	15	1.00	16	1.00	0	0.0	257100.0	0.0	0.0	0.0	NYHR

35 ELZ	5	15	1.00	16	1.00	0	0.0	2>7100.0	0.0	0.0	0.0		NYHR
36 AKL	1	16	3.00	17	3.00	0	0.0	106732.0	0.0	0.0	0.0		NYHR
37 AKL	5	16	3.00	17	3.00	0	0.0	106732.0	0.0	0.0	0.0		NYHR
38 CAR	3	17	7.50	22	7.50	0	0.0	85065.0	0.0	0.0	0.0		NYHR
39 CAR	7	17	7.50	22	7.50	0	0.0	85065.0	0.0	0.0	0.0		NYHR

EQUATION 1 OF TYPE 2 C DN (18.5 NI) (1.DBLE) (0.) PASS
EQUATION 2 OF TYPE 6 M DN (18.5 NI) (1.DBLE) (0.) PASS
EQUATION 3 OF TYPE 1 C 2D (1.DBLE) (2.DBLE) (0.) PASS
EQUATION 4 OF TYPE 1 C 2D (9.DBLE) (2.DBLE) (0.) PASS
EQUATION 5 OF TYPE 9 M3D2 (1.DBLE) (2.DBLE) (9.DBLE) PASS
EQUATION 6 OF TYPE 1 C 2D (2.DBLE) (3.DBLE) (0.) PASS
EQUATION 7 OF TYPE 5 M 2D (2.DBLE) (3.DBLE) (0.) PASS
EQUATION 8 OF TYPE 1 C 2D (3.DBLE) (4.DBLE) (0.) PASS
EQUATION 9 OF TYPE 5 M 2D (3.DBLE) (4.DBLE) (0.) PASS
EQUATION 10 OF TYPE 1 C 2D (4.DBLE) (5.DBLE) (0.) PASS
EQUATION 11 OF TYPE 1 C 2D (12.DBLE) (5.DBLE) (0.) PASS
EQUATION 12 OF TYPE 9 M3D2 (4.DBLE) (5.DBLE) (12.DBLE) PASS
EQUATION 13 OF TYPE 1 C 2D (5.DBLE) (6.DBLE) (0.) PASS
EQUATION 14 OF TYPE 5 M 2D (5.DBLE) (6.DBLE) (0.) PASS
EQUATION 15 OF TYPE 1 C 2D (6.DBLE) (7.DBLE) (0.) PASS
EQUATION 16 OF TYPE 1 C 2D (14.DBLE) (7.DBLE) (0.) PASS
EQUATION 17 OF TYPE 9 M3D2 (14.DBLE) (7.DBLE) (6.DBLE) PASS
EQUATION 18 OF TYPE 4 C DC (7.DBLE) (19.5 CM) (0.) PASS
EQUATION 19 OF TYPE 13 MLCM (7.DBLE) (19.5 CM) (0.) PASS
EQUATION 20 OF TYPE 2 C DN (20.5 NI) (10.DBLE) (0.) PASS
EQUATION 21 OF TYPE 6 M DN (20.5 NI) (10.DBLE) (0.) PASS
EQUATION 22 OF TYPE 1 C 2D (10.DBLE) (8.DBLE) (0.) PASS

EQUATION	23 OF TYPE 1	C 2D	(10,DBLE)	(11,DBLE)	(0.)	PASS
EQUATION	24 OF TYPE 8	M3D1	(10,DBLE)	(8,DBLE)	(11,DBLE)	PASS
EQUATION	25 OF TYPE 1	C 2D	(8,DBLE)	(9,DBLE)	(0.)	PASS
EQUATION	26 OF TYPE 5	M 2D	(8,DBLE)	(9,DBLE)	(0.)	PASS
EQUATION	27 OF TYPE 1	C 2D	(11,DBLE)	(12,DBLE)	(0.)	PASS
EQUATION	28 OF TYPE 5	M 2D	(11,DBLE)	(12,DBLE)	(0.)	PASS
EQUATION	29 OF TYPE 4	C DC	(13,DBLE)	(21.5 CM)	(0.)	PASS
EQUATION	30 OF TYPE 4	C DC	(15,DBLE)	(21.5 CM)	(0.)	PASS
EQUATION	31 OF TYPE 12	MCM2	(13,DBLE)	(15,DBLE)	(21.5 CM)	PASS
EQUATION	32 OF TYPE 1	C 2D	(13,DBLE)	(14,DBLE)	(0.)	PASS
EQUATION	33 OF TYPE 5	M 2D	(13,DBLE)	(14,DBLE)	(0.)	PASS
EQUATION	34 OF TYPE 1	C 2D	(15,DBLE)	(16,DBLE)	(0.)	PASS
EQUATION	35 OF TYPE 5	M 2D	(15,DBLE)	(16,DBLE)	(0.)	PASS
EQUATION	36 OF TYPE 1	C 2D	(16,DBLE)	(17,DBLE)	(0.)	PASS
EQUATION	37 OF TYPE 5	M 2D	(16,DBLE)	(17,DBLE)	(0.)	PASS
EQUATION	38 OF TYPE 3	C DP	(17,DBLE)	(22.5 PI)	(0.)	PASS
EQUATION	39 OF TYPE 7	M DP	(17,DBLE)	(22.5 PI)	(0.)	PASS

MODEL RUN NYHA COMPUTED 0672 NY HARBOR TEST RUN
DATA GIVEN IN ORIGINAL UNITS

SECTION	KFO	JUNCTION ID AND DISTANCE AT ENDS		KK REM.RATE (1/DAY)	AK REA.RATE (1/DAY)	DK DEO.RATE (1/DAY)	E DISP.RATE (MI2/DAY)	FF ULT/SDAY	TEMP (CENT)	PDEL MILE-INCR (MI)
1 RVDL DBLE	1	(SPD, -13.0)	(YNK, -15.9)	0.250	0.100	0.250	20.000	1.000	23.370	1.000
2 GWBR DBLE	1	(UPT, -9.6)	(SPD, -13.0)	0.250	0.100	0.250	20.000	1.000	23.370	1.000
3 NOTN DBLE	1	(NOT, -5.2)	(UPT, -9.6)	0.250	0.100	0.250	20.000	1.000	23.370	1.000
4 BNTN DBLE	1	(BAT, 0.0)	(NOT, -5.2)	0.250	0.100	0.250	20.000	1.000	23.370	1.000
5 GVIS DBLE	1	(RUH, 1.5)	(BAT, 0.0)	0.250	0.070	0.250	24.000	1.000	22.070	1.000
6 UPRY DBLE	1	(STN, 4.1)	(RUH, 1.5)	0.250	0.070	0.250	24.000	1.000	22.070	1.000
7 NARR DBLE	1	(NAR, 9.0)	(STN, 4.1)	0.250	0.070	0.250	24.000	1.000	22.070	1.000
8 UHRL DBLE	1	(HAR, -4.0)	(HLG, -7.0)	0.250	0.300	0.250	15.000	1.000	23.250	1.000
9 LHRL DBLE	1	(SPD, 0.0)	(HAR, -4.0)	0.250	0.300	0.250	15.000	1.000	23.250	1.000
10 HIKI DBLE	1	(HLG, 9.2)	(CPT, 5.0)	0.250	0.080	0.250	10.000	1.000	21.940	1.000
11 UPER DBLE	1	(NTN, -4.1)	(HLG, -7.7)	0.250	0.090	0.250	10.000	1.000	22.470	1.000
12 LWER DBLE	1	(BAT, 0.0)	(NTN, -4.1)	0.250	0.090	0.250	10.000	1.000	22.470	1.000
13 UKVK DBLE	1	(KVK, -1.5)	(NRK, -3.0)	0.250	0.125	0.250	10.000	1.000	23.420	1.000
14 LKVK DBLE	1	(STN, 0.0)	(KVK, -1.5)	0.250	0.125	0.250	10.000	1.000	23.420	1.000
15 UAKL DBLE	1	(ELZ, 1.0)	(NRK, 0.0)	0.250	0.150	0.250	10.000	1.000	24.680	1.000
16 MAKL DBLE	1	(AKL, 3.0)	(ELZ, 1.0)	0.250	0.150	0.250	10.000	1.000	24.680	1.000
17 LAKL DBLE	1	(CAR, 7.5)	(AKL, 3.0)	0.250	0.150	0.250	10.000	1.000	24.680	1.000
18 YONK S NI	2	(YNK, -15.9)	(YTN, -20.0)	0.250	0.100	0.250	20.000	1.000	23.370	1.000
19 LWAY S CM	4	(LBY, 13.0)	(NAR, 9.0)	0.250	0.070	0.250	24.000	1.000	20.820	1.000
20 LISD S NI	2	(CPT, 5.0)	(LIS, 0.0)	0.250	0.080	0.250	10.000	1.000	21.940	1.000
21 NWKR S CM	4	(NRK, 0.0)	(PAS, -2.0)	0.250	0.300	0.250	10.000	1.000	24.000	1.000
22 RARN S PI	3	(RAR, 12.0)	(CAR, 7.5)	0.250	0.150	0.250	10.000	1.000	24.680	1.000

SECTION	CROSS SEC-AREA (FT**2)	Q FLOW (CFS)	BD BENTHL-DMD (GMS/M2-DAY)	PR PHOTO-RESP (MG/L-DAY)	TIDEI TIDE-COEF	HT DEPTH (FT.)	VOL VOLUME (FT**3)	WU UNF-LOAD (LBS/DAY-MI)

1	RVOL	DBLE	0.135E 06	0.729E 04	0.0	0.0	0.0	0.350E 02	0.0	0.690E 04
2	GWBR	DBLE	0.135E 06	0.729E 04	0.0	0.0	0.0	0.320E 02	0.0	0.585E 05
3	MDTN	DBLE	0.135E 06	0.729E 04	0.0	0.0	0.0	0.500E 02	0.0	0.585E 05
4	DNTN	DBLE	0.135E 06	0.729E 04	0.0	0.0	0.0	0.500E 02	0.0	0.293E 05
5	GVIS	DBLE	0.340E 06	0.729E 04	0.0	0.0	0.0	0.490E 02	0.0	0.0
6	UPBY	DBLE	0.340E 06	0.729E 04	0.0	0.0	0.0	0.560E 02	0.0	0.0
7	NARR	DBLE	0.340E 06	0.729E 04	0.0	0.0	0.0	0.350E 02	0.0	0.0
8	UHRL	DBLE	0.680E 04	0.0	0.0	0.0	0.0	0.200E 02	0.0	0.0
9	LHRL	DBLE	0.680E 04	0.0	0.0	0.0	0.0	0.180E 02	0.0	0.0
10	RIKI	DBLE	0.100E 06	0.0	0.0	0.0	0.0	0.600E 02	0.0	0.0
11	UPER	DBLE	0.800E 05	0.0	0.0	0.0	0.0	0.400E 02	0.0	0.398E 05
12	LWER	DBLE	0.800E 05	0.0	0.0	0.0	0.0	0.330E 02	0.0	0.544E 05
13	UKVK	DBLE	0.500E 05	0.0	0.0	0.0	0.0	0.350E 02	0.0	0.0
14	LKVK	DBLE	0.500E 05	0.0	0.0	0.0	0.0	0.350E 02	0.0	0.0
15	UAKL	DBLE	0.265E 05	0.0	0.0	0.0	0.0	0.350E 02	0.0	0.0
16	MAKL	DBLE	0.280E 05	0.0	0.0	0.0	0.0	0.350E 02	0.0	0.0
17	LAKL	DBLE	0.350E 05	0.0	0.0	0.0	0.0	0.350E 02	0.0	0.0
18	YONK	S NI	0.135E 06	0.729E 04	0.0	0.0	0.0	0.400E 02	0.0	0.0
19	LWBY	S CN	0.340E 06	0.729E 04	0.0	0.0	0.350E 00	0.350E 02	0.120E 11	0.0
20	LISD	S NI	0.150E 06	0.0	0.0	0.0	0.0	0.650E 02	0.0	0.0
21	NWKB	S CN	0.680E 05	0.0	0.0	0.0	0.0	0.200E 02	0.120E 10	0.0
22	MARN	S PI	0.500E 05	0.0	0.0	0.0	0.0	0.350E 02	0.0	0.326E 04

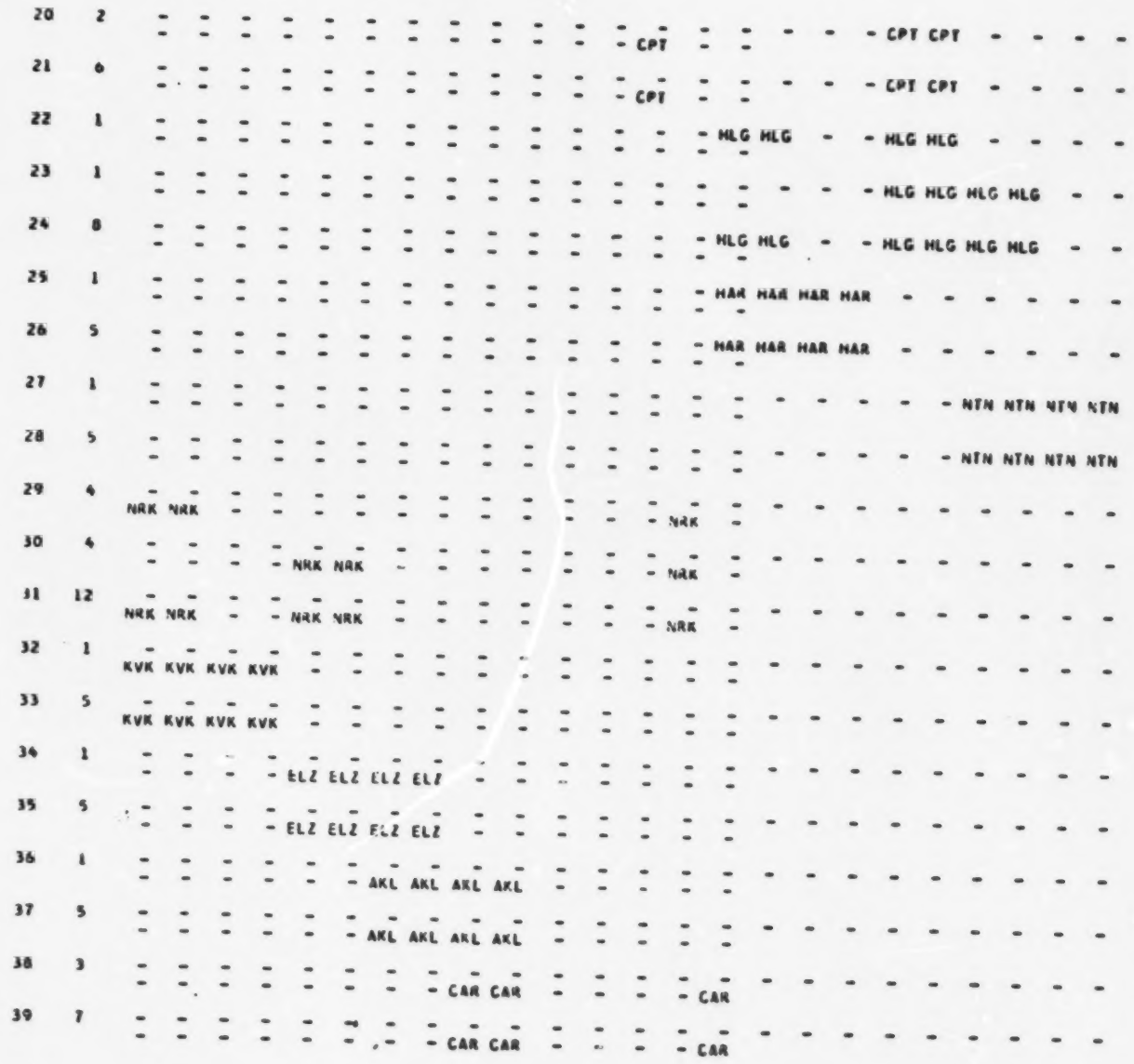
	EQUATION	JUNCTION ID, SECTIONS MEETING AT JUNCTION, AND DISTANCE				W PI-LOAD (LBS/DAY)	JD FLOW-DAM (CFS)	OD DEF-DAM (MG/L)	BOD BOD-DAM (MG/L)
1	2 C DN YNK	(18-15.91)	(1-15.91)	0	0.0)	118600.00000	0.0	0.0	0.0
2	6 N DN YNK	(18-15.91)	(1-15.91)	0	0.0)	118600.00000	0.0	0.0	0.0
3	1 C 2D SPD	(1-13.01)	(2-13.01)	0	0.0)	0.0	0.0	0.0	0.0
4	1 C 2D SPD	(9 0.01)	(2-13.01)	0	0.0)	0.0	0.0	0.0	0.0
5	9 M302 SPD	(1-13.01)	(2-13.01)	9	0.0)	0.0	0.0	0.0	0.0
6	1 C 2D UPT	(2 -9.61)	(3 -9.61)	0	0.0)	0.0	0.0	0.0	0.0

7	5	M	2D	UPT	(	2	-9.6)(	3	-9.6)(	0	0.0)	0.0	0.0	0.0	0.0
8	1	C	2D	MDT	(	3	-5.2)(	4	-5.2)(	0	0.0)	86450.00000	0.0	0.0	0.0
9	5	M	2D	MDT	(	3	-5.2)(	4	-5.2)(	0	0.0)	86450.00000	0.0	0.0	0.0
10	1	C	2D	BAT	(	4	0.0)(	5	0.0)(	0	0.0)	100450.00000	0.0	0.0	0.0
11	1	C	2D	BAT	(	12	0.0)(	5	0.0)(	0	0.0)	100450.00000	0.0	0.0	0.0
12	9	M3D2	BAT	(	4	0.0)(	5	0.0)(	12	0.0)	100450.00000	0.0	0.0	0.0
13	1	C	2D	RDH	(	5	1.5)(	6	1.5)(	0	0.0)	68300.00000	0.0	0.0	0.0
14	5	M	2D	RDH	(	5	1.5)(	6	1.5)(	0	0.0)	68300.00000	0.0	0.0	0.0
15	1	C	2D	STN	(	6	4.1)(	7	4.1)(	0	0.0)	**********	0.0	0.0	0.0
16	1	C	2D	STN	(	14	0.0)(	7	4.1)(	0	0.0)	**********	0.0	0.0	0.0
17	9	M3D2	STN	(	14	0.0)(	7	4.1)(	6	4.1)	**********	0.0	0.0	0.0
18	4	C	DC	NAR	(	7	9.0)(	19	9.0)(	0	0.0)	0.0	0.0	0.0	0.0
19	13	MICM	NAR	(	7	9.0)(	19	9.0)(	0	0.0)	0.0	0.0	0.0	0.0
20	2	C	DN	CPT	(	20	5.0)(	10	5.0)(	0	0.0)	121000.00000	0.0	0.0	0.0
21	6	M	DN	CPT	(	20	5.0)(	10	5.0)(	0	0.0)	121000.00000	0.0	0.0	0.0
22	1	C	2D	MLG	(	10	9.2)(	8	-7.0)(	0	0.0)	13 500.00000	0.0	0.0	0.0
23	1	C	2D	MLG	(	10	9.2)(	11	-7.7)(	0	0.0)	131500.00000	0.0	0.0	0.0
24	8	M3D1	MLG	(	10	9.2)(	8	-7.0)(	11	-7.7)	131500.00000	0.0	0.0	0.0
25	1	C	2D	NAR	(	8	-4.0)(	9	-4.0)(	0	0.0)	0.0	0.0	0.0	0.0
26	5	M	2D	NAR	(	8	-4.0)(	9	-4.0)(	0	0.0)	0.0	0.0	0.0	0.0
27	1	C	2D	NTW	(	11	-4.1)(	12	-4.1)(	0	0.0)	59800.00000	0.0	0.0	0.0
28	5	M	2D	NTW	(	11	-4.1)(	12	-4.1)(	0	0.0)	59800.00000	0.0	0.0	0.0
29	4	C	DC	NRK	(	13	-3.0)(	21	0.0)(	0	0.0)	0.0	0.0	0.0	0.0
30	4	C	DC	NRK	(	15	0.0)(	21	0.0)(	0	0.0)	0.0	0.0	0.0	0.0
31	12	MCM2	NRK	(	13	-3.0)(	15	0.0)(	21	0.0)	0.0	0.0	0.0	0.0
32	1	C	2D	NVK	(	13	-1.5)(	14	-1.5)(	0	0.0)	0.0	0.0	0.0	0.0
33	5	M	2D	NVK	(	13	-1.5)(	14	-1.5)(	0	0.0)	0.0	0.0	0.0	0.0
34	1	C	2D	ELZ	(	15	1.0)(	16	1.0)(	0	0.0)	257100.00000	0.0	0.0	0.0
35	5	M	2D	ELZ	(	15	1.0)(	16	1.0)(	0	0.0)	257100.00000	0.0	0.0	0.0
36	1	C	2D	AKL	(	16	3.0)(	17	3.0)(	0	0.0)	106732.00000	0.0	0.0	0.0
37	5	M	2D	AKL	(	16	3.0)(	17	3.0)(	0	0.0)	106732.00000	0.0	0.0	0.0

38	3 C DP CAR	(17	7.51(	22	7.51(	0	0.01	85065.00000	0.0	0.0	0.0
39	7 M DP CAR	(17	7.51(	22	7.51(	0	0.01	85065.00000	0.0	0.0	0.0

SYMBOLIC DO DEFICIT AND BOD MATRIX

ROW	JBV	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39									
1	2	YNK	YNK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	YNK	-	-	-	-									
2	6	YNK	YNK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	YNK	-	-	-	-									
3	1	SPD	SPD	SPD	SPD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
4	1	-	-	SPD	SPD	-	-	-	-	-	-	-	-	-	-	-	-	SPD	SPD	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
5	9	SPD	SPD	SPD	SPD	-	-	-	-	-	-	-	-	-	-	-	-	SPD	SPD	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
6	1	-	-	UPT	UPT	UPT	UPT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
7	5	-	-	UPT	UPT	UPT	UPT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
8	1	-	-	-	-	MDT	MDT	MDT	MDT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
9	5	-	-	-	-	MDT	MDT	MDT	MDT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
10	1	-	-	-	-	-	-	BAT	BAT	BAT	BAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
11	1	-	-	-	-	-	-	-	-	BAT	BAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								BAT	BAT
12	9	-	-	-	-	-	-	BAT	BAT	BAT	BAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								BAT	BAT
13	1	-	-	-	-	-	-	-	-	RDH	RDH	RDH	RDH	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
14	5	-	-	-	-	-	-	-	-	RDH	RDH	RDH	RDH	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
15	1	-	-	-	-	-	-	-	-	-	-	STN	STN	STN	STN	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
16	1	-	-	-	-	-	-	-	-	-	-	-	-	STN	STN	-	-	-	-	-	-	-	-	-	-
		-	-	STN	STN	-	-	-	-	-	-	-	-	-	-	-									
17	9	-	-	-	-	-	-	-	-	-	-	STN	STN	STN	STN	-	-	-	-	-	-	-	-	-	-
		-	-	STN	STN	-	-	-	-	-	-	-	-	-	-	-									
18	4	-	-	-	-	-	-	-	-	-	-	-	-	NAR	NAR	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	NAR	-	-	-	-									
19	13	-	-	-	-	-	-	-	-	-	-	-	-	NAR	NAR	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	NAR	-	-	-	-									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21 6 CPT CPT CPT
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25 1 HAR HAR HAR HAR HAR HAR
26 5 HAR HAR HAR HAR HAR HAR
27 1 NTN NTN NTN NTN
28 5 NTN NTN NTN NTN
29 4 NRK NRK NRK
30 4 NRK NRK NRK
31 12 NRK NRK NRK NRK NRK
32 1 KVK KVK KVK KVK
33 5 KVK KVK KVK KVK
34 1 ELZ ELZ ELZ ELZ
35 5 ELZ ELZ ELZ ELZ
36 1 AKL AKL AKL AKL
37 5 AKL AKL AKL AKL
38 3 CAR CAR CAR
39 7 CAR CAR CAR

MODEL RUN NYHR COMPUTED 0672 NY HARBOR TEST RUN
DATA GIVEN IN COMPATIBLE UNITS

SECTION	KFO	JUNCTION ID AND DISTANCE AT ENDS	KK REM.RATE (1/DAY)	AK REA.RATE (1/DAY)	DK DEO.RATE (1/DAY)	E DISP.RATE (MI2/DAY)	FF ULT/SDAY	TEMP (CENT)	PDEL MILE-INCR (MI)
1 KVOL DBLE	1	(SPD, -13.0) (YNK, -15.9)	0.285	0.107	0.285	20.000	1.000	23.370	1.000
2 GWBR DBLE	1	(UPT, -9.6) (SPD, -13.0)	0.285	0.107	0.285	20.000	1.000	23.370	1.000
3 MDTN DBLE	1	(MDT, -5.2) (UPT, -9.6)	0.285	0.107	0.285	20.000	1.000	23.370	1.000
4 DNTN DBLE	1	(BAT, 0.0) (MDT, -5.2)	0.285	0.107	0.285	20.000	1.000	23.370	1.000
5 GVIS DBLE	1	(RDH, 1.5) (BAT, 0.0)	0.271	0.073	0.271	24.000	1.000	22.070	1.000
6 UPBY DBLE	1	(STN, 4.1) (RDH, 1.5)	0.271	0.073	0.271	24.000	1.000	22.070	1.000
7 NARR DBLE	1	(NAR, 9.0) (STN, 4.1)	0.271	0.073	0.271	24.000	1.000	22.070	1.000
8 UHRL DBLE	1	(HAR, -4.0) (HLG, -7.0)	0.284	0.320	0.284	15.000	1.000	23.250	1.000
9 LHRL DBLE	1	(SPD, 0.0) (HAR, -4.0)	0.284	0.320	0.284	15.000	1.000	23.250	1.000
10 KIKI DBLE	1	(HLG, 9.2) (CPT, 5.0)	0.270	0.083	0.270	10.000	1.000	21.940	1.000
11 UPER DBLE	1	(NTN, -4.1) (HLG, -7.7)	0.275	0.095	0.275	10.000	1.000	22.470	1.000
12 LWER DBLE	1	(BAT, 0.0) (NTN, -4.1)	0.275	0.095	0.275	10.000	1.000	22.470	1.000
13 UKVK DBLE	1	(KVK, -1.5) (NRK, -3.0)	0.286	0.134	0.286	10.000	1.000	23.420	1.000
14 LKVK DBLE	1	(STN, 0.0) (KVK, -1.5)	0.286	0.134	0.286	10.000	1.000	23.420	1.000
15 UAKL DBLE	1	(ELZ, 1.0) (NRK, 0.0)	0.300	0.165	0.300	10.000	1.000	24.680	1.000
16 MAKL DBLE	1	(AKL, 3.0) (ELZ, 1.0)	0.300	0.165	0.300	10.000	1.000	24.680	1.000
17 LAKL DBLE	1	(CAR, 7.5) (AKL, 3.0)	0.300	0.165	0.300	10.000	1.000	24.680	1.000
18 YONK S NI	2	(YNK, -15.9) (YON, -20.0)	0.285	0.107	0.285	20.000	1.000	23.370	1.000
19 LWBY S CN	4	(LBY, 13.0) (NAR, 9.0)	0.258	0.071	0.258	24.000	1.000	20.820	1.000
20 LISD S NI	2	(CPT, 5.0) (LIS, 0.0)	0.270	0.083	0.270	10.000	1.000	21.940	1.000
21 NWKB S CN	4	(NKK, 0.0) (PAS, -2.0)	0.292	0.325	0.292	10.000	1.000	24.000	1.000
22 RARN S PI	3	(RAR, 12.0) (CAR, 7.5)	0.300	0.165	0.300	10.000	1.000	24.680	1.000

SECTION	CROSS SEC-AREA (MI**2)	Q FLOW (MI**3/DAY)	BD BENTHL-DMD (GMS/M2-DAY)	PR PHOTO-RESP (MG/L-DAY)	TIDEI TIDE-COEF	HT DEPTH (MTRS)	VOL VOLUME (MI**3)	MU/AREA*RK UNF-LOAD (MG/L)

1 RVDL DBLE	0.484E-02	0.428E-02	0.0	0.0	0.0	0.107E 02	0.0	0.751E-03
2 GWRR DBLE	0.484E-02	0.428E-02	0.0	0.0	0.0	0.975E 01	0.0	0.637E-02
3 MDTN DBLE	0.484E-02	0.428E-02	0.0	0.0	0.0	0.152E 02	0.0	0.637E-02
4 DNTN DBLE	0.484E-02	0.428E-02	0.0	0.0	0.0	0.152E 02	0.0	0.318E-02
5 GVIS DBLE	0.122E-01	0.428E-02	0.0	0.0	0.0	0.149E 02	0.0	0.0
6 UPBY DBLE	0.122E-01	0.428E-02	0.0	0.0	0.0	0.171E 02	0.0	0.0
7 NAHR DBLE	0.122E-01	0.428E-02	0.0	0.0	0.0	0.107E 02	0.0	0.0
8 UHRL DBLE	0.244E-03	0.0	0.0	0.0	0.0	0.610E 01	0.0	0.0
9 LHRL DBLE	0.244E-03	0.0	0.0	0.0	0.0	0.549E 01	0.0	0.0
10 RIKI DBLE	0.359E-02	0.0	0.0	0.0	0.0	0.183E 02	0.0	0.0
11 UPER DBLE	0.287E-02	0.0	0.0	0.0	0.0	0.122E 02	0.0	0.433E-02
12 LWER DBLE	0.287E-02	0.0	0.0	0.0	0.0	0.101E 02	0.0	0.592E-02
13 UKVK DBLE	0.179E-02	0.0	0.0	0.0	0.0	0.107E 02	0.0	0.0
14 LKVK DBLE	0.179E-02	0.0	0.0	0.0	0.0	0.107E 02	0.0	0.0
15 UAKL DBLE	0.951E-03	0.0	0.0	0.0	0.0	0.107E 02	0.0	0.0
16 MAKL DBLE	0.100E-02	0.0	0.0	0.0	0.0	0.107E 02	0.0	0.0
17 LAKL DBLE	0.126E-02	0.0	0.0	0.0	0.0	0.107E 02	0.0	0.0
18 YORK S NI	0.484E-02	0.428E-02	0.0	0.0	0.0	0.122E 02	0.0	0.0
19 LWRY S CM	0.122E-01	0.428E-02	0.0	0.0	0.350E 00	0.107E 02	0.815E-01	0.0
20 LISD S NI	0.538E-02	0.0	0.0	0.0	0.0	0.198E 02	0.0	0.0
21 NWKB S CM	0.244E-02	0.0	0.0	0.0	0.0	0.610E 01	0.815E-02	0.0
22 RARN S PI	0.179E-02	0.0	0.0	0.0	0.0	0.107E 02	0.0	0.355E-03

SECTION	U	S	V	SD	VD	B	C	G	H	ZZ	FAC
1 RVDL DBLE	0.88327	0.14355	-0.09938	0.09845	-0.05429	10.54405	0.04686	19.21931	-0.04218	1.45	-1.60
2 GWRR DBLE	0.88327	0.14355	-0.09938	0.09845	-0.05429	-0.25954	-0.61092	-3.13409	-5.54147	12.30	-1.60
3 MDTN DBLE	0.88327	0.14355	-0.09938	0.09845	-0.05429	-0.25953	-0.61091	-3.13406	-5.54146	12.30	-1.60
4 DNTN DBLE	0.88327	0.14355	-0.09938	0.09845	-0.05429	0.88562	0.43995	1.00239	0.00695	6.15	-1.60
5 GVIS DBLE	0.35071	0.11385	-0.09923	0.06291	-0.04830	1.44112	2.18923	3.30737	6.89994	0.0	-1.37
6 UPBY DBLE	0.35071	0.11385	-0.09923	0.06291	-0.04830	1.34062	2.32759	3.02304	7.03589	0.0	-1.37

7	MAKK DBLE	0.35071	0.11385	-0.09923	0.06291	-0.04830	-0.22085	6.06827	-2.13043	15.16661	0.0	-1.37
8	JHRL DBLE	0.0	0.13760	-0.13760	0.14605	-0.14605	0.98118	1.36448	-6.29290	-8.40562	0.0	7.90
9	LHRL DBLE	0.0	0.13760	-0.13760	0.14605	-0.14605	0.98118	1.36448	-6.29287	-8.40561	0.0	7.90
10	MIKI DBLE	0.0	0.16425	-0.16425	0.09118	-0.09118	0.81348	1.19246	4.61569	1.37646	0.0	-1.45
11	UPER DBLE	0.0	0.16596	-0.16596	0.09722	-0.09722	0.07329	-0.43086	-7.13412	-4.41807	15.96	-1.52
12	LWER DBLE	0.0	0.16596	-0.16596	0.09722	-0.09722	-3.26220	-0.54393	-16.42650	-6.22028	21.82	-1.52
13	UKVK DBLE	0.0	0.16908	-0.16908	0.11565	-0.11565	1.18651	2.50113	2.85627	8.71378	0.0	-1.88
14	LKVK DBLE	0.0	0.16908	-0.16908	0.11565	-0.11565	1.18651	2.50113	2.85625	8.71378	0.0	-1.88
15	UAKL DBLE	0.0	0.17331	-0.17331	0.12828	-0.12828	9.12211	-4.25399	29.58304	-13.61738	0.0	-2.21
16	MAKL DBLE	0.0	0.17331	-0.17331	0.12828	-0.12828	2.03637	5.76725	7.37567	15.08534	0.0	-2.21
17	LAKL DBLE	0.0	0.17331	-0.17331	0.12828	-0.12828	0.44899	10.25771	1.90665	26.89362	0.0	-2.21
18	YOVK S NI	0.88327	0.14345	-0.09938	0.09845	-0.05429	18.10229	0.0	29.84416	0.0	0.0	-1.60
19	LWAY S CM	0.35071	0.11128	-0.09667	0.06224	-0.04763	1.86892	0.0	3.51024	0.0	0.0	-1.38
20	LISD S NI	0.0	0.16425	-0.16425	0.09118	-0.09118	1.04422	0.0	5.16876	0.0	0.0	-1.45
21	NWKB S CM	0.0	0.17102	-0.17102	0.18020	-0.18020	4.86811	0.0	5.19846	0.0	0.0	9.06
22	KARN S PI	0.0	0.17331	-0.17331	0.12828	-0.12828	0.0	13.88085	0.0	32.98453	1.20	-2.21

	EQUATION	JUNCTION ID, SECTIONS MEETING AT JUNCTION, AND DISTANCE						PT-LOAD (MI**3/DAY)	(MG/L)	QD FLOW-DAM (MI**3/DAY)	DD DEF-DAM (MG/L)	BDD BOD-DAM (MG/L)
1	2 C DN YNK	(18-15.91	(1-15.91	(0	0.0)			0.01291		0.0	0.0	0.0
2	6 M DN YNK	(18-15.91	(1-15.91	(0	0.0)			0.01291		0.0	0.0	0.0
3	1 C 2D SPD	(1-13.01	(2-13.01	(0	0.0)			0.0		0.0	0.0	0.0
4	1 C 2D SPD	(9 0.01	(2-13.01	(0	0.0)			0.0		0.0	0.0	0.0
5	9 M3D2 SPD	(1-13.01	(2-13.01	(9	0.0)			0.0		0.0	0.0	0.0
6	1 C 2D UPT	(2 -9.61	(3 -9.61	(0	0.0)			0.0		0.0	0.0	0.0
7	5 M 2D UPT	(2 -9.61	(3 -9.61	(0	0.0)			0.0		0.0	0.0	0.0
8	1 C 2D MDT	(3 -5.21	(4 -5.21	(0	0.0)			0.00941		0.0	0.0	0.0
9	5 M 2D MDT	(3 -5.21	(4 -5.21	(0	0.0)			0.00941		0.0	0.0	0.0
10	1 C 2D BAT	(4 0.01	(5 0.01	(0	0.0)			0.01094		0.0	0.0	0.0
11	1 C 2D BAT	(12 0.01	(5 0.01	(0	0.0)			0.01094		0.0	0.0	0.0
12	9 M3D2 BAT	(4 0.01	(5 0.01	(12	0.0)			0.01094		0.0	0.0	0.0

13	1	C	2D	ROH	(	5	1.5)(	6	1.5)(	0	0.0)	0.00744	0.0	0.0	0.0
14	5	M	2D	ROH	(	5	1.5)(	6	1.5)(	0	0.0)	0.00744	0.0	0.0	0.0
15	1	C	2D	STN	(	6	4.1)(	7	4.1)(	0	0.0)	0.15133	0.0	0.0	0.0
16	1	C	2D	STN	(	14	0.0)(	7	4.1)(	0	0.0)	0.15133	0.0	0.0	0.0
17	9	M3D2	STN	(	14	0.0)(	7	4.1)(	6	4.1)		0.15133	0.0	0.0	0.0
18	4	C	DC	NAR	(	7	9.0)(	19	9.0)(	0	0.0)	0.0	0.0	0.0	0.0
19	13	MICM	NAR	(	7	9.0)(	19	9.0)(	0	0.0)		0.0	0.0	0.0	0.0
20	2	C	DN	CPT	(	20	5.0)(	10	5.0)(	0	0.0)	0.01317	0.0	0.0	0.0
21	6	M	DN	CPT	(	20	5.0)(	10	5.0)(	0	0.0)	0.01317	0.0	0.0	0.0
22	1	C	2D	HLG	(	10	9.2)(	8	-7.0)(	0	0.0)	0.01432	0.0	0.0	0.0
23	1	C	2D	HLG	(	10	9.2)(	11	-7.7)(	0	0.0)	0.01432	0.0	0.0	0.0
24	8	M3D1	HLG	(	10	9.2)(	8	-7.0)(	11	-7.7)		0.01432	0.0	0.0	0.0
25	1	C	2D	HAR	(	8	-4.0)(	9	-4.0)(	0	0.0)	0.0	0.0	0.0	0.0
26	5	M	2D	HAR	(	8	-4.0)(	9	-4.0)(	0	0.0)	0.0	0.0	0.0	0.0
27	1	C	2D	NTN	(	11	-4.1)(	12	-4.1)(	0	0.0)	0.06651	0.0	0.0	0.0
28	5	M	2D	NTN	(	11	-4.1)(	12	-4.1)(	0	0.0)	0.06651	0.0	0.0	0.0
29	4	C	DC	NRK	(	13	-3.0)(	21	0.0)(	0	0.0)	0.0	0.0	0.0	0.0
30	4	C	DC	NRK	(	15	0.0)(	21	0.0)(	0	0.0)	0.0	0.0	0.0	0.0
31	12	MCM2	NRK	(	13	-3.0)(	15	0.0)(	21	0.0)		0.0	0.0	0.0	0.0
32	1	C	2D	KVK	(	13	-1.5)(	14	-1.5)(	0	0.0)	0.0	0.0	0.0	0.0
33	5	M	2D	KVK	(	13	-1.5)(	14	-1.5)(	0	0.0)	0.0	0.0	0.0	0.0
34	1	C	2D	ELZ	(	15	1.0)(	16	1.0)(	0	0.0)	0.02739	0.0	0.0	0.0
35	5	M	2D	ELZ	(	15	1.0)(	16	1.0)(	0	0.0)	0.02799	0.0	0.0	0.0
36	1	C	2D	AKL	(	16	3.0)(	17	3.0)(	0	0.0)	0.01162	0.0	0.0	0.0
37	5	M	2D	AKL	(	16	3.0)(	17	3.0)(	0	0.0)	0.01162	0.0	0.0	0.0
38	3	C	DP	CAR	(	17	7.5)(	22	7.5)(	0	0.0)	0.00926	0.0	0.0	0.0
39	7	M	DP	CAR	(	17	7.5)(	22	7.5)(	0	0.0)	0.00926	0.0	0.0	0.0

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
1	RVDL	-15.9	1.8471	3.2837	YNK
1	RVDL	-14.9	1.9517	3.4734	
1	RVDL	-13.9	2.1639	3.6616	
1	RVDL	-13.0	2.3457	3.8284	SPD

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
2	GWBR	-13.0	2.3457	3.6284	SPD
2	GWBR	-12.0	2.5499	4.0048	
2	GWBR	-11.0	2.7332	4.1739	
2	GWBR	-10.0	2.8974	4.3336	
2	GWBR	-9.6	2.9580	4.3944	UPT

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
3	HDTN	-9.6	2.9581	4.3944	UPT
3	HDTN	-8.6	3.0980	4.5378	
3	HDTN	-7.6	3.2222	4.6672	
3	HDTN	-6.6	3.3318	4.7809	
3	HDTN	-5.6	3.4276	4.8774	
3	HDTN	-5.2	3.4623	4.9107	HDT

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
4	ONTN	-5.2	3.4623	4.9107	HDT
4	ONTN	-4.2	3.4573	4.9803	
4	ONTN	-3.2	3.4689	5.0299	
4	ONTN	-2.2	3.4981	5.0585	
4	ONTN	-1.2	3.5459	5.0650	
4	ONTN	-0.2	3.6141	5.0477	
4	ONTN	0.0	3.6304	5.0412	BAT

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
5	GVIS	0.0	3.6304	5.0412	BAT
5	GVIS	1.0	3.5973	4.9853	
5	GVIS	1.5	3.5959	4.9474	RDH

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
6	UPBY	1.5	3.5959	4.9474	RDH
6	UPBY	2.5	3.5982	4.8514	
6	UPBY	3.5	3.6415	4.7279	
6	UPBY	4.1	3.6876	4.6401	STN

NYHR

NY HARBOR TEST RUN
COMPUTED 0677

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
7	NARR	4.1	3.6876	4.6401	STN
7	NARR	5.1	3.2635	4.4545	
7	NARR	6.1	2.8703	4.2427	
7	NARR	7.1	2.5041	4.0081	
7	NARR	8.1	2.1609	3.7537	
7	NARR	9.0	1.8689	3.5103	NAR

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION TO
8	UHRL	-7.0	3.9494	5.5655	HLG
8	UHRL	-6.0	3.5451	5.1909	
8	UHRL	-5.0	3.2080	4.8599	
8	UHAL	-4.0	2.9318	4.5719	HAR

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
9	LHRL	-4.0	2.9318	4.5719	HAR
9	LHRL	-3.0	2.7111	4.3258	
9	LHRL	-2.0	2.5419	4.1207	
9	LHRL	-1.0	2.4208	3.9553	
9	LHRL	0.0	2.3457	3.8285	SPD

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
10	RIKI	5.0	2.3738	4.7229	CPT
10	RIKI	6.0	2.6245	4.9797	
10	RIKI	7.0	2.9461	5.2069	
10	RIKI	8.0	3.3473	5.3977	
10	RIKI	9.0	3.8391	5.5429	
10	RIKI	9.2	3.9494	5.5654	HLG

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION TO
11	UPER	-7.7	3.9494	5.5654	HLG
11	UPER	-6.7	4.1896	5.7205	
11	UPER	-5.7	4.3943	5.8143	
11	UPER	-4.7	4.5691	5.8420	
11	UPER	-4.1	4.6617	5.8250	NTN

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
12	LWER	-4.1	4.8617	5.8250	NTN
12	LWER	-3.1	4.5428	5.7386	
12	LWER	-2.1	4.3427	5.5815	
12	LWER	-1.1	4.0558	5.3577	
12	LWER	-0.1	3.6741	5.0729	
12	LWER	0.0	3.6304	5.0414	BAT

NYHR

NY HARBOR TEST RUN
COMPUTED 0472

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
13	UKVK	-3.0	4.8661	5.1984	NRK
13	UKVK	-2.0	4.3536	5.0665	
13	UKVK	-1.5	4.1439	4.9785	KVK

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
14	LKVK	-1.5	4.1439	4.9785	KVK
14	LKVK	-0.5	3.8121	4.7644	
14	LKVK	0.0	3.6876	4.6400	STN

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION TO
15	UAKL	0.0	4.8681	5.1984	NAK
15	UAKL	1.0	7.2713	5.5718	ELZ

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
16	NAKL	1.0	7.2713	5.5719	ELZ
16	NAKL	2.0	6.9579	5.8152	
16	NAKL	3.0	6.8540	5.9446	AKL

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SLCT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
17	LAKL	3.0	6.8540	5.9446	AKL
17	LAKL	4.0	6.0264	5.9549	
17	LAKL	5.0	5.3803	5.8816	
17	LAKL	6.0	4.8962	5.7431	
17	LAKL	7.0	4.5596	5.5515	
17	LAKL	7.5	4.4432	5.4382	CAR

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
18	YONK	-20.0	1.0254	2.5261	YON
18	YONK	-19.0	1.1837	2.7040	
18	YONK	-18.0	1.3664	2.8874	
18	YONK	-17.0	1.5773	3.0749	
18	YONK	-16.0	1.8208	3.2647	
18	YONK	-15.9	1.8471	3.2837	YNK

NYHA

NY HARBOR TEST RUN
COMPUTED 06/2

SECT. NO.	SECT. NAME	DIST. MI	HOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
19	LWBY	9.0	1.8689	3.5102	YAR
19	LWBY	10.0	1.8689	3.5102	
19	LWBY	11.0	1.8689	3.5102	
19	LWBY	12.0	1.8689	3.5102	
19	LWBY	13.0	1.8689	3.5102	LBY

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	MID MG/L	D.O DEFICIT MG/L	JUNCTION ID
20	LISD	0.0	1.0442	3.6594	LIS
20	LISD	1.0	1.2306	3.8834	
20	LISD	2.0	1.4503	4.1064	
20	LISD	3.0	1.7092	4.3243	
20	LISD	4.0	2.0143	4.5320	
20	LISD	5.0	2.3738	4.7229	CPT

NYHR

NY HARBOR TEST RUN
COMPUTED 0672

SECT. NO.	SECT. NAME	DIST. MI	D.O MG/L	D.O DEFICIT MG/L	JUNCTION ID
21	NWKB	-2.0	4.8681	5.1985	PAS
21	NWKB	-1.0	4.8681	5.1985	
21	NWKB	0.0	4.8681	5.1985	NAK

NYHR

NY HARBOR TEST RUN
COMPUTED 0677

SECT. NO.	SECT. NAME	DIST. MI	BOD MG/L	D.O DEFICIT MG/L	JUNCTION ID
22	RARN	7.5	4.4432	5.4382	CAR
22	RARN	8.5	3.8412	5.2526	
22	RARN	9.5	3.3349	5.0377	
22	RARN	10.5	2.9092	4.8053	
22	RARN	11.5	2.5512	4.5644	
22	RARN	12.0	2.3942	4.4430	RAR